East Texas Hills — *Avery Johnson*

The HUMBLE WAY

JULY-AUGUST, 1950

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The First Six Months

HUMBLE'S operations for the first six months of 1950 were reported to stockholders in the following interim report which was mailed August 10.

Humble's net crude oil production and net income in the first half of 1950 were at a rate around 10 per cent lower than for the year 1949. This unfavorable comparison occurred because a rapid increase in drilling in West Texas brought about substantial additional production in which Humble did not participate materially, and because the Railroad Commission of Texas early in 1950 changed its method of allocating production as between fields from that based on maximum efficient rates. Humble's production was cut in several fields with the result that the Company's output in the first half of 1950 in Texas was considerably less than the average in 1949, although production for the State as a whole was at about the same rate.

Allocation on the basis of maximum efficient rates was restored in the order for August, 1950. In addition, allowables were increased in response to higher demands. Continuation of an equitable basis of allocation and a strong demand for the remainder of the year should mean substantially larger production for Humble in the last half than in the first half of 1950. The recent strong demand for petroleum should also have a favorable influence on refinery runs and other operations.

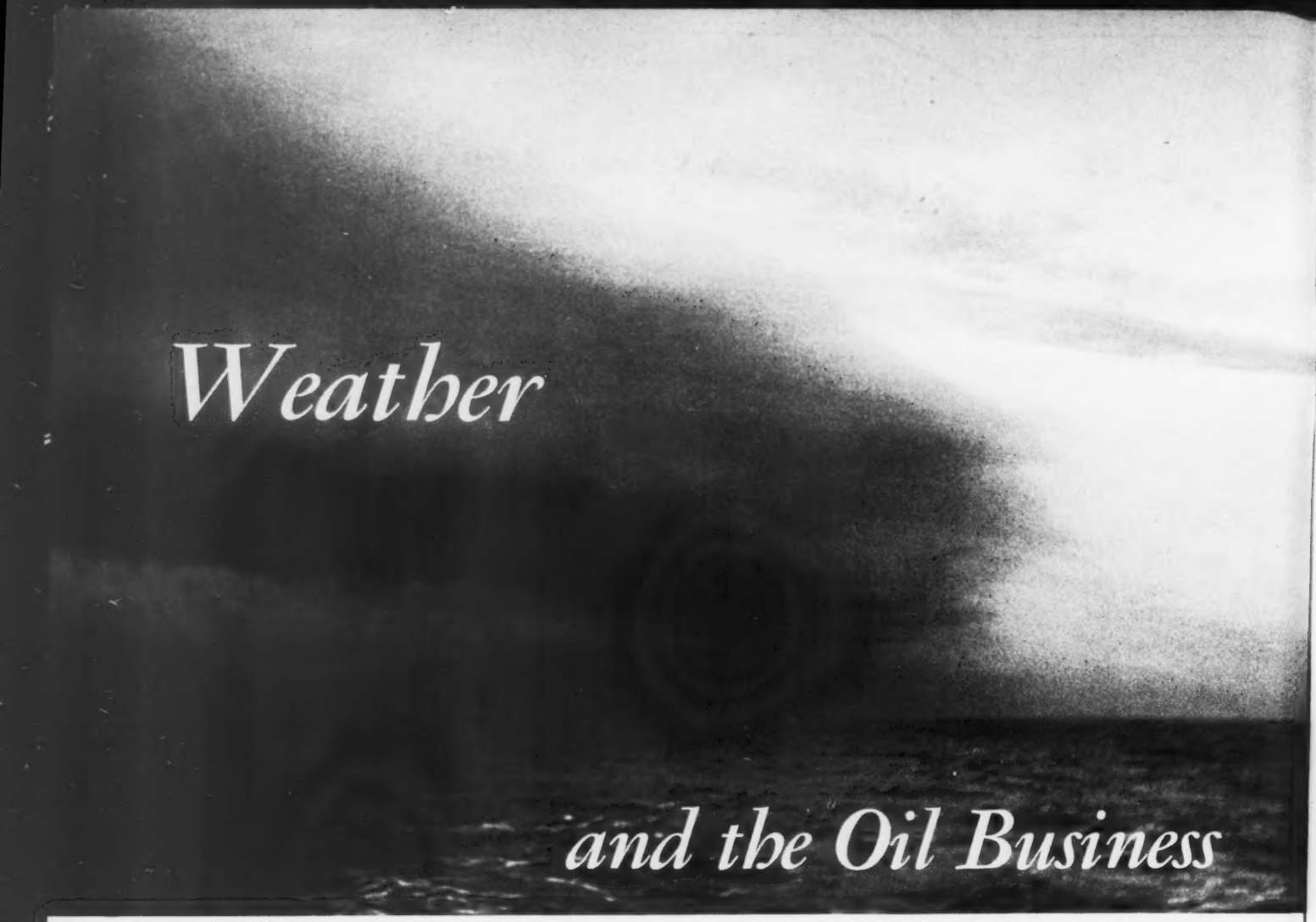
Capital expenditures of $55,055,000 in the first six months of 1950 were substantially less than in the same period a year ago. Present plans indicate that these expenditures in 1950 may be slightly less than in 1949.

Dividends for the first half of 1950 were paid at the rate of $1.00 a share each quarter, the same as in 1949.

FINANCIAL DATA	Six Months Ended June 30, 1950	Six Months Ended June 30, 1949
Gross Operating Income	$355,141,900	$392,646,800
Net Income	$ 53,856,800	$ 66,360,100
Dividends Paid	$ 35,951,400	$ 35,951,400
Capital Expenditures	$ 55,055,000	$ 68,125,900
Net Income Per Share	$3.00	$3.69
Dividends Per Share	$2.00	$2.00
OPERATING DATA—Barrels Daily		
Net Crude Oil Production	251,300	293,100
Crude Oil Refined	200,200	211,200
Trunk Line Deliveries	529,100	575,200

The interim financial data for 1950 are subject to change by final audit for the year.

Roadside parks along Texas highways are welcome vistas for summer travelers and vacationers. (See page 12)



Weather and the Oil Business

Ominous black clouds of a cold front roll over the Gulf of Mexico, bringing rain and heavy seas to offshore drilling operations.

Stormy or fair, hot or cold, wet or dry, the weather must be reckoned with in every phase of operations

*"EVERYBODY talks about the weather, but nobody does anything about it."**

Charles Dudley Warner might have said that differently, or not at all, if he had had an opportunity to observe the operations of a major oil company.

That is not to imply that in an oil company like Humble anyone actually does anything about the weather as such. But because weather exerts a widespread influence on all phases of operations, there are many employees engaged in an almost continuous program of cooperating with weather or counteracting its vagaries. As a result, experience has developed definite plans for rolling with the weather's punches rather than taking the direct blows.

About this time of the year tropical storms begin brewing in the Caribbean Sea. That is when Humble's central storm warning offices at Grand Isle, New Orleans, and Houston prepare for immediate action to protect lives and property. Communications are established with the U. S. Weather Bureau, the U. S. Army Signal Corps, and with tankers at sea.

Based on reports from these sources, experts in the warning centers estimate the speed and direction of movement of the storm, and forecast the probable area where the disturbance may move inland. Over Company telephone and telegraph lines they send regular dispatches to

*This now famous quotation is often erroneously credited to Mark Twain. According to Burton Stevenson's "Home Book of Proverbs" it was written by Charles Dudley Warner in an editorial in the *Hartford Courant,* Hartford, Connecticut, about 1890.

all major centers in exploration, drilling and production, refining, pipeline, and sales operations which might be affected.

Likely danger spots are Baytown refinery, drilling rigs in shallow bays and on land locations, employee communities, and pipe line and sales installations all along the Gulf Coast.

Most vulnerable to tropical hurricanes are the Company's drilling and producing operations out in the Gulf of Mexico, off the coast of Louisiana. For that reason Humble has set up at its Grande Isle, Louisiana, base an observation station equipped with radar and other weather instruments. The station's observations are supplemented with regular weather and wave forecasts from a firm of industrial meteorologists in New Orleans.

A constant vigil is maintained. If a tropical storm comes within a 200-mile radius of this Humble radar installation, the operator tracks it continuously. Very close contact is maintained with all offshore drilling platforms by short-wave radio, and, if the disturbance threatens to strike in the area, immediate preparations are made to abandon the location. All equipment on the platform is made fast and, if time permits, pipe is pulled out of the well being drilled and is laid down on the platform or the LST. In ample time crew members are hurried to shore. Here all of the smaller floating equipment—crew boats, barges, tenders—is anchored in the Company's protected harbor to ride out the storm. Large drilling tenders are secured on storm moorings, and all employees and families are moved inland for safety.

Hurricane effect is wide

While all of this activity is in progress off the Louisiana coast, safety measures are taken in other operations. Reports continue to go out from the central warning office in Houston, their frequency and extent depending upon where the storm threatens to strike. Should that be anywhere within the vicinity of Baytown refinery, one of the most complicated and expensive precautionary measures is taken. Baytown refinery is shut down.

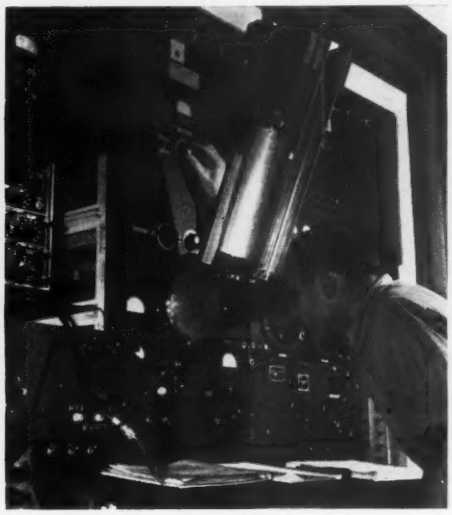
On a planned schedule employees take the big refining units "off stream" and then go to their homes. Only the central power plant is kept operating and a skeleton crew of electricians remains on the job.

The task of putting the big refinery "on stream" again after the storm is even greater than it was to shut it down. It takes from 24 to 36 hours to fire up the multitude of units again because many depend on feed stock from sister units. Also, some are hard to get into balanced operation after being shut down. Following last September's storm it took operators two weeks to get the entire plant running smoothly at capacity again.

Less complicated but more unusual than the refinery's problem is that which Humble Pipe Line Company faces. Tankers and barges due in to load crude oil at Humble's Baytown and Ingleside docks do not arrive on schedule. Barges tie up and wait outside the storm area; tankers put in at probable storm-free ports or ride the storm out at sea. That means that hundreds of thousands of barrels of crude oil due for loading remain in storage tanks. Continuous pipe line flow soon fills all terminal tankage, so that oil en route to the coast must be stored in tank farms along the way and pump stations have to be shut down. At storm's end, maybe a week later, tankers and barges arrive in quick succession. Terminal storage tanks are drained to fill the sudden demand, and the pipe line system has to be rushed to capacity to meet needs.

Bothersome as tropical storms are to the Humble Companies, they are not responsible for all weather problems. Cold weather brings an entirely

Hurricanes and rain squalls—some with spectacular waterspouts (left) as seen near Humble's drilling platforms off Grand Isle, Louisiana—are major hazards to offshore drilling operations. At Grand Isle, Humble's oceanographer keeps a constant vigil observing and tracking disturbances with radar (center). As a disturbance is tracked and plotted on weather maps (right), regular forecasts of winds and waves are made. Forecasts have been invaluable in giving warning of storms.



different and vexing series of situations; so does a long rainy spell, or a long dry spell.

Cold oil moves slowly

An extended cold spell in the upper area of Texas raises havoc with pipe line schedules. Crude oil thickens as it becomes cold and runs slower through lines. An eight-inch line from Talco to Longview in Northeast Texas delivers, not heated or boosted, 7,000 barrels of Talco crude oil daily in warm weather; a long cold spell will drop the delivery to 4,600 barrels a day. Under the same conditions, the drop in a 10-inch line between Longview and Monroe, Louisiana, is even sharper—from a normal weather volume of 21,000 barrels to a cold weather maximum of 7,000 barrels.

That same long wintry period may also affect all other phases of operations.

If snow is on the ground in the Panhandle and in West Texas, geophysics crews remain inactive to avoid damage to ranch roads. Field geologists stay indoors because rock outcrops on creek banks and in railroad and highway cuts cannot be studied.

Cold weather reduces highway driving. Service station operators note a drop in business, and have trouble keeping driveways cleared of ice and snow for safety. However, they see their antifreeze sales and their service calls zooming upward.

At Baytown refinery steam meters are cut off to avoid breakage, and the damage to valves is high.

But the trials brought on by cold weather are no greater than those accompanying a long rainy spell. Transportation to and from drilling locations becomes more difficult, and necessary construction is handicapped. Flooded rivers and creeks cause breaks in pipe lines and disruption of service. Geophysics crews can't work unless they have "bad weather" spots (areas where high ground and all-weather roads permit them to work) set aside, as they usually do.

Rain can be helpful

Rain reduces highway travel almost as much as icy weather. Sales volume falls off, but flood conditions afford the Sales Department a chance to give an extra service to motorists. Humble Touring Service, through bulk agencies and pipe line stations, receives and passes along to motorists up-to-the-minute information on road and stream conditions.

Bad weather may be turned to advantage. There is one major Gulf Coast oil field whose discovery can be credited to a long rainy spell. It was back in 1936 when Humble geophysics operations were scheduled for a certain area. A competitive company was also planning to shoot the same area, but because of prolonged rains changed its schedule. Humble crews went ahead in spite of mud. The information gained resulted in substantial acreage being leased. Some months later a "wildcat" well drilled on the land discovered what has become one of the highly productive fields in the Gulf Coast area.

Sun spots cause trouble

Contrasting with the wet weather problems there are those which come with long dry spells: Geophysics crews must haul over long distances the water they need to drill shot holes. Still other crews operating in the low areas of Louisiana cannot get into the marshes in dry periods; they must wait until water again covers the lowlands so they can use small boats. At Baytown refinery a long drouth brings on a water conservation program, since most of the fresh water used daily comes from deep wells which produce less during a drouth.

But one man's problem is another's gain. Bulk agents in the ranch areas of West and Southwest Texas gain a particular type of business from

Mud mire makes moving rig equipment such as this mud pump difficult. Board roads and mats are built at drilling locations where rainy weather is a problem.

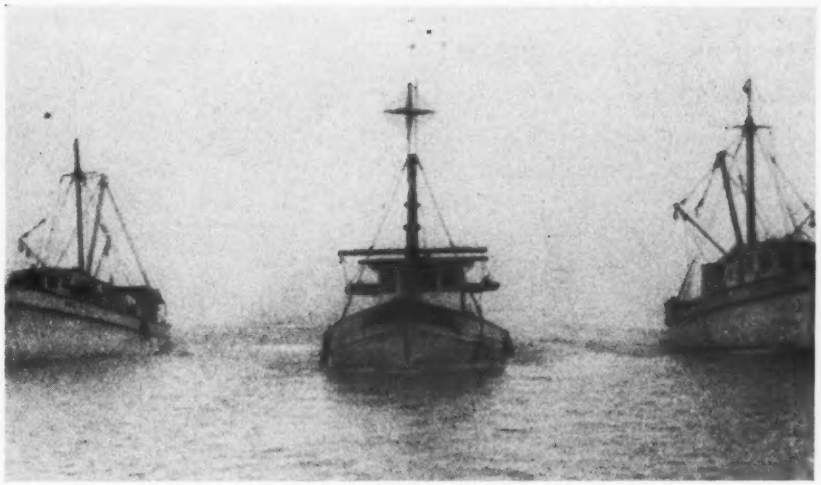
Welder finds pipe line construction and repair is tougher in wet muddy weather.

long dry spells. Their kerosene sales mount. Ranchers buy kerosene for "pear burning"—burning the needles off cactus so that cattle can eat the watery pulp in lieu of an adequate water and forage supply.

Probably the most unusual weather condition interfering with any phase of oil operations is the "magnetic storm." This invisible, unpredictable phenomenon caused, scientists believe, by sun spots makes magnetic exploration equipment temporarily unreliable. The occurrence of such disturbances is detected by an observatory in Arizona, and Humble and other subscribing clients are informed of it. While such a storm prevails, then, magnetometer crews remain idle no matter how pleasant the weather may be.

So, whatever the weather—rain or shine, hot or cold, stormy or fair—it brings some problems for the oil industry. And while weather may be somewhat unpredictable, it repeats itself enough in all its forms that programs and plans can be and have been set up to cooperate with it or combat it.

Contrary to the broad observation made by Charles Dudley Warner, some people in the Humble Companies are almost constantly doing more about the weather than just talking about it.

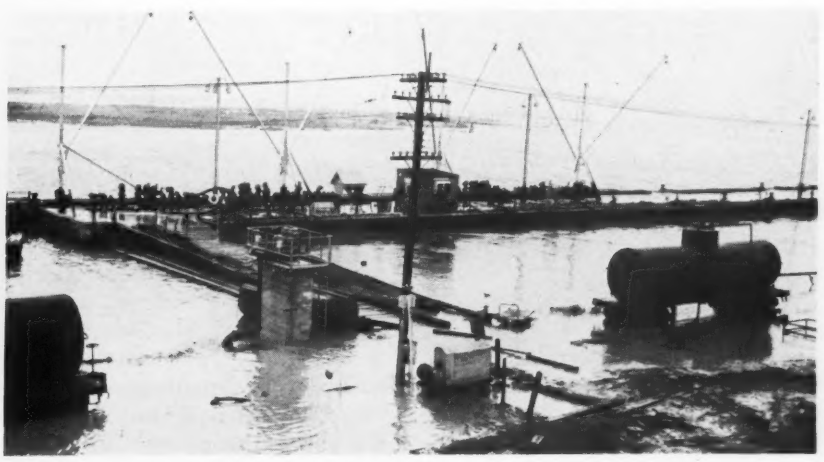


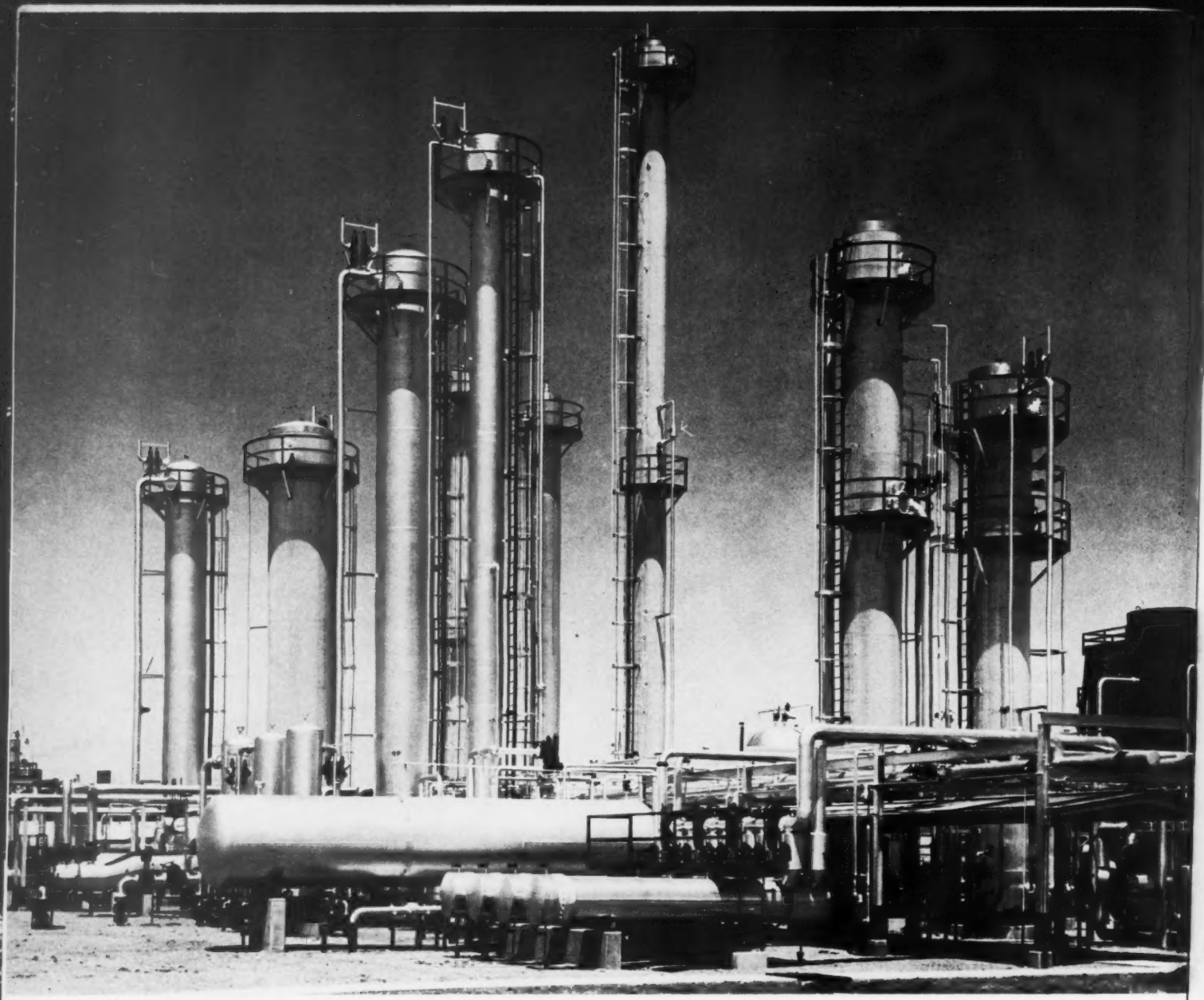
Geophysics boats operating offshore are handicapped by fog, but not stopped. Radar gives the fleet "eyes" to survey areas and to navigate to shore bases.

Ice and snow slow down most operations; ice (left) causes damage to small instrument lines at Baytown Refinery, and gaugers (right) must keep oil moving.

Rain slows service station sales, but opening day sales record was set in rain.

Floods from too much rain have caused much damage to docks at Baytown Refinery. All operations were suspended by flood rains of the September, 1949, hurricane.





Jourdanton plant towers for distillation and fractionation rise like a giant pipe organ in this photo by Mel Coston. Towers are part of equipment for extracting propane, butane, natural gasoline from casinghead gas produced in five oil fields.

Milestones in Conservation

Humble's vast post-war gas conservation program completed to add capacity of 300 million cubic feet daily; 32 projects cost $33 million

ON JUNE 21, operators began opening the valves, starting the engines, and pushing the switches to start up Humble's new gasoline plant at Jourdanton, 36 miles south of San Antonio. Months of hard work had gone into the planning and construction of the plant, and special care was taken to start each unit properly. Step by step, pressure was built up and each unit was tested before the next phase of the process was started. "Starting up" is a tedious and methodical job, necessarily so because of the high pressures and delicate balance required to produce products of proper specification. At Jourdanton, it required almost a week to put the plant in full operation, and then minor adjustments remained to be made to produce specification pro-

pane, butane, and natural gasoline.

As the plant settled down to its operating level, its impact became obvious. Gas flares in five nearby oil fields had vanished. Industries and people of South Texas cities and towns had a new source of natural gas; rural families all over the area had a new source of butane and propane for home heating and for cooking.

The new plant—like many others in the Southwest—makes it possible to utilize completely the casinghead gas which is produced with oil. When operating at capacity, the Jourdanton plant will process, and thereby conserve, 26 million cubic feet of gas daily—enough to supply the needs of 120,000 homes. (The average residential consumer uses about 217 cubic feet of gas per day.)

The Jourdanton plant marks the last of the major projects included in Humble's vast casinghead gas conservation program originally planned at the end of World War II. Thirty-two projects, ranging from gas gathering systems and plant additions to construction of entire new plants such as Jourdanton, have added a total capacity of 300 million cubic feet of gas daily to Humble's gas conservation facilities. The total cost of this program to Humble was $33 million. These are in addition to the 13 projects Humble owned or had an interest in at the end of World War II.

In all, Humble has invested about $42 million on gas conservation projects with capacity to handle 450 million cubic feet of Humble's casinghead gas daily.

Gas conservation has long been of major concern to the oil industry. Gas from gas wells can be conserved by merely shutting the well in if there is no market for the gas, but casinghead gas must be produced with oil. The primary function of casinghead gas is accomplished when oil is produced in a non-wasteful manner. To be fully conserved, since there is no practical way of storing it above ground, casinghead gas must be marketed or returned to the ground as it is produced.

Until about 25 years ago, most casinghead gas was flared after it was produced with oil, since it did not bring a price that would repay the cost of gathering it from wells in the field; and, consequently, few people were willing to spend the money to install gas gathering facilities. This condition has been greatly improved during the past decade, primarily because distant markets were made accessible to gas producing areas by the construction of big-inch transmission lines prompted by technical advancement. But as late as 1945, only about 43 per cent of the casinghead gas produced in Texas was being utilized fully.

World War II complicated the task of conserving natural gas. Construction materials were scarce, and war and post-war demands practically doubled oil production since 1940. By 1945 casinghead gas produced far exceeded capacity of pre-war conservation facilities. It was generally thought that oil requirements would drop after the war's end, but instead the demand for oil has climbed higher. As it did, the gas conservation problem became increasingly important.

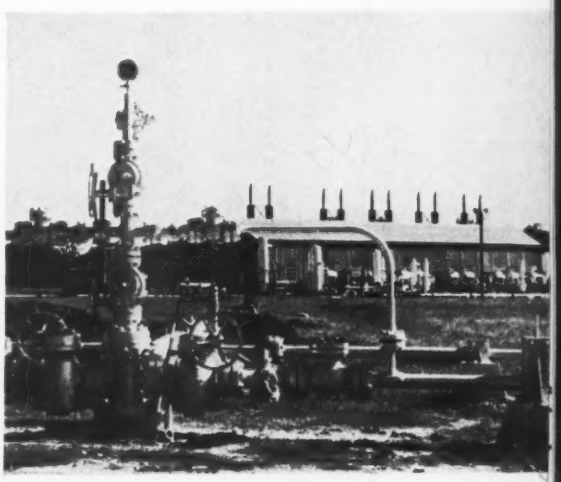
At war's end, members of the oil industry and the Texas Railroad Commission charted plans for conserving as much casinghead gas as possible. The industry proceeded rapidly, as materials became available, in the fields where conservation measures were most urgent.

Conserving natural gas presents unique problems—all with expensive solutions. From the oil-gas separator in the field, the gas must be piped through an intricate gathering system to a central compressor station. There the pressure is raised to that required for disposition—to be marketed or returned to the producing formation.

If a market is available the gas will be sold as fuel or a raw material for making plastics and other products. When necessary, expensive compressors raise the pressure of the gas enough to enter the transmission line, and the gas is sold directly if it is "dry" of liquids.

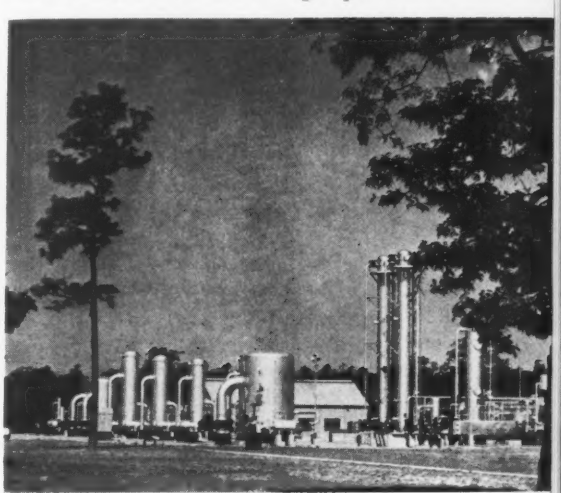
But if the gas is "wet," the liquids must be removed before "dried" gas

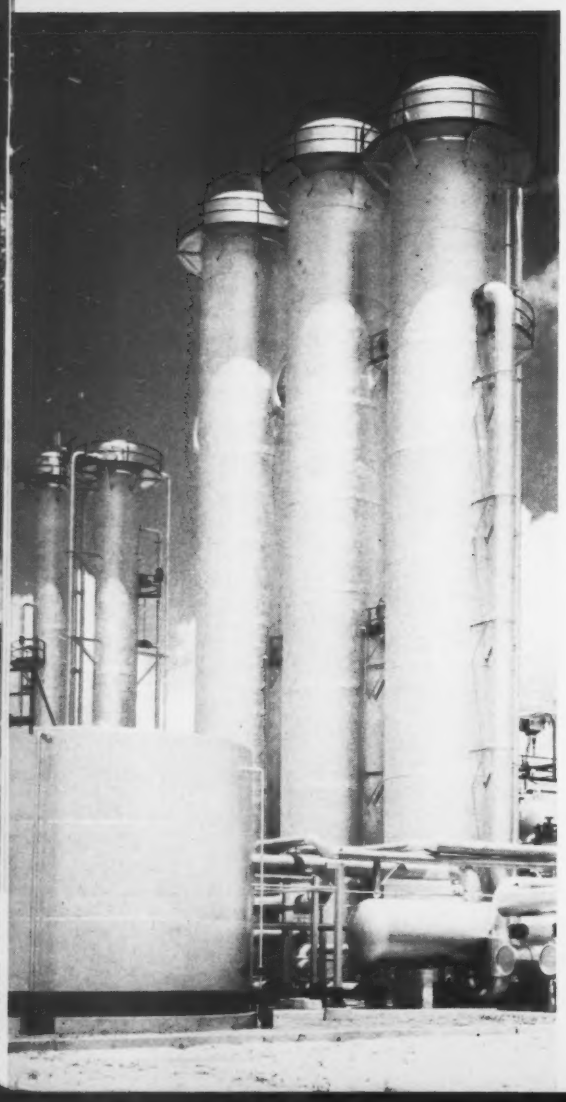
Thompsons compressor plant raises the pressure of casinghead gas from oil wells for delivery into gas transmission system.



Gas injection well near Lovell Lake compressor plant is used to return casinghead gas to oil reservoir to maintain pressure and increase recovery of oil.

New Conroe plant (below) supplies gas for aiding oil production and making carbon black after extracting liquids.





is sold, since it is possible that liquids in the gas could extinguish the flame at the burner tip. The liquids are removed to prevent this explosion and asphyxiation hazard.

Removing the liquids requires an elaborate and costly plant, though sale of the products provides some return on the cost of the gas conservation system. Some plants—Jourdanton is one—require additional facilities to remove sulphur compounds where they are present in the gas.

In some fields, it is necessary to return the gas to the oil producing formation to maintain reservoir pressure and increase ultimate oil production. Since 1945, Humble has built additions to one such plant and constructed two more.

In some cases, gas is compressed and returned to an underground reservoir for storage and possible future use. Since World War II, Humble has built two compressor plants of this type. Such plants operate at a loss, as there is no current revenue to offset the operating expenses or provide a return on investment. Their sole purpose is to prevent flaring of gas.

Since 1945, the oil industry has invested more than a quarter of a billion dollars in some 140 projects in Texas alone. These have raised the total amount of gas fully conserved or utilized to around 70 per cent of the casinghead gas produced in the state, a remarkable gain over the 43 per cent fully utilized in 1945.

Under present conditions, engineers estimate that it is economically feasible to fully conserve only about 80 per cent of the casinghead gas produced. It would be practical to conserve even a larger proportion of the gas if the price of gas in the field increased enough to cover marginal high-cost cases.

In Texas, the achievements in oil and gas conservation have been the result of close cooperation of the oil industry and the Texas Railroad Commission. As the program originally scheduled after the war nears completion, the industry is moving on ahead in gas conservation. New projects are being built as new oil fields are discovered and studies are being made to extend gas conservation further.

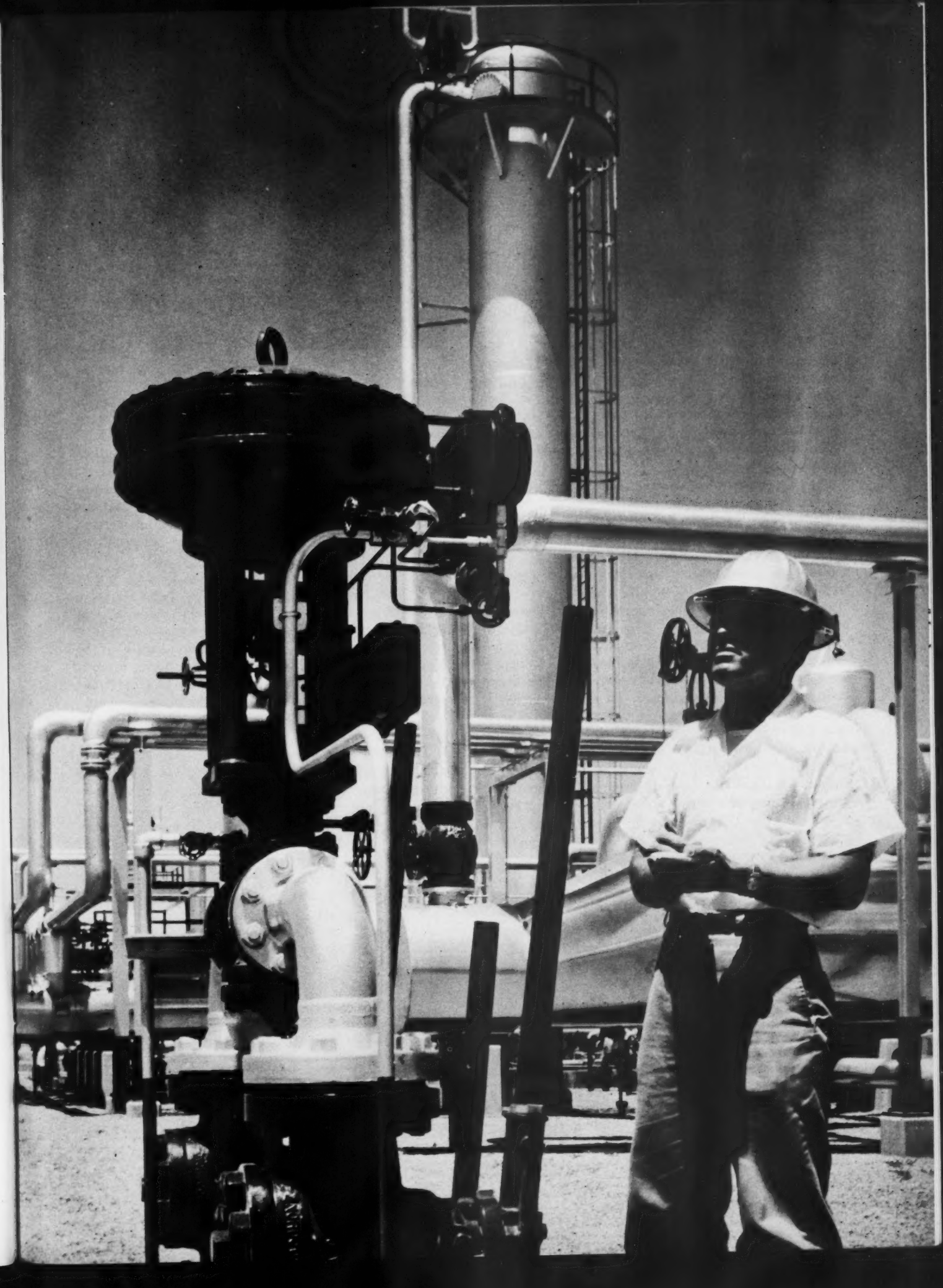
Humbles' post-war program, as originally planned, has been completed, and about 85 per cent of the casinghead gas produced by the Company is being fully conserved. Humble is moving ahead, however, and is now participating in the construction of a new plant to conserve casinghead gas in a new oil field in West Texas. New projects and extensions of others are being considered to conserve more casinghead gas.

Gas Processing

In addition to its casinghead gas conservation facilities, Humble has projects for conserving products from gas from gas wells. Since 1945, Humble has invested a total of more than $9.5 million in three major projects of this type.

At Opelousas, Louisiana, (**above**) both casinghead and gas-well gas are stripped of liquid products before the "dry" gas is delivered to market for use as fuel. **At Katy, Texas,** (**left**) new distillation towers are part of additions recently made to increase recovery of ethane and propane liquids from gas-well gas. This plant is also the largest plant of its type in the world, with a capacity of more than 500 million cubic feet of gas daily. Operated by Humble for itself and other operators, the plant cycles gas; that is, "wet" gas produced from gas wells is stripped of liquids, and the "dry" gas is returned to the producing formation to aid in the production of more "wet" gas.

Engineer checks air-controlled regulating valve at Humble's new Jourdanton natural gasoline plant. Tower in background is part of plant's equipment for removing sulfur from "sour" casinghead gas from nearby oil fields. This is Humble's only plant with facilities for processing "sour" gas.



Colorful Texas Travelways

By R. S. Rodman

Supervising Landscape Architect
Texas Highway Department

HIGHWAYS of today, with their pleasant scenes and full open view, bid you on whether you travel for business or pleasure.

The pleasing experience you get from motoring along the highways of Texas is not a matter of chance. In recent years Texas Highway Department designers have had your safety, comfort, and convenience in mind as they planned new travelways.

Early day roads were not much more than trails which permitted travel by horse-drawn vehicles. With the advent of the horseless carriage, road builders improved these trails by giving them a hard surface and taking out some of the sharp curves that probably resulted from early travelers going around a stump or tree that happened to be in the way.

As the speed and number of automobiles increased, people demanded better and safer highways. And they took more or less for granted a smooth riding surface.

Today the Texas Highway Department has a section on landscaping that improves and beautifies the right of ways; builds and keeps up roadside parks for your enjoyment.

There is more to the landscaping of the right of ways than first meets the eye. To make you feel at ease when driving, you must have full view of a spacious highway and right of way. This view requires the flattening of the cut and fill slopes and covering them with vegetation to protect the roadsides against the loss of soil caused by the water and wind. Covering these slopes with native grasses improves the appearance of the highway and harmonizes in with the surrounding countryside.

The Department conserves and plants native wild flowers on the right of ways. These flowers grow well among the native grasses and provide additional protection against erosion, besides furnishing a mass of color. More than 300,000 pounds of wild flower seeds, bluebonnet, Indian paint brush and others, have been distributed along Texas highways.

A phase of planting that the public has endorsed is the use of native trees and shrubs.

The numerous views provided both on and off the highway present a moving picture and permit you to enjoy nature and overcome the monotony. Properly planned, plantings increase your safety because they tend to keep you alert and warn you of points of danger.

Members of the Department responsible for selecting native plant material for the right of way prefer those that have beauty in flower, foliage, fruit, or habit of growth. Among the more widely used are dogwood, redbud, magnolia, crape myrtle, wisteria, yaupon, senisa, mountain laurel, retama, huisache, cacti, flowering willow, bird of paradise, sumac, and others.

As a result of this program to conserve and set out native plants, Texas highway right of ways are fast becoming a sanctuary for many of the native plants that face extinction from the agricultural and industrial development.

Another feature of highway planning for your enjoyment is the series of roadside parks. The Texas Highway Department has developed more than 650 roadside parks so that you may stop off the busy travelway in attractive surroundings and relax in safety. Areas adjacent to the highways are improved by clearing underbrush, pruning trees, grading and constructing drives, building stone entrances, tables, benches and open fireplaces. Facilities built of the most durable native materials reduce vandalism and fit into the natural surroundings.

Texas Highway Department prefers locating roadside parks near water, or a grove of trees, or a spot offering a panoramic view. In the western part of the state distances are great between the towns, and there are no trees or water. Here you will find arbors for shade and, in many instances, water provided.

Popularity of these parks with Texans is evidenced by the numerous letters of commendation received by the Department. In a recent survey conducted by it, more than 53 per cent of all out-of-state tourists entering Texas indicated they used these parks one or more times during their visit. A large percentage of these tourists commended the Texas Highway Department upon their development.

Of course the landscape work of the Texas Highway Department is only one of many services rendered you as a traveler by the Department. Its great value to all citizens of the state and visitors to the state cannot be measured by any financial or statistical yardstick.

The aesthetic and psychological value of beauty along the travelways of the state form an immeasurable treasure for Texas and its guests. This treasure of beautiful roadsides improves with the passage of time.

EAST TEXAS TODAY

Crape Myrtle Adds Sparkle to Area's Green Hillsides

THIS ROLLING country of rusty red soil and evergreen pines excites the motorist with an anticipation of things to come as the changing panorama unfolds before him. Wide and gently winding highways add greatly to the enjoyment of the countryside.

For the cover painting, artist Avery Johnson found a scene near Nacogdoches that was full of the rich colors which he likes to portray. In the watercolor, he contrasts the deep green of the East Texas pines, the red soil, and the rich pink of the crape myrtle blossoms along the road.

In summer, highways throughout the state are enhanced by the profusely blooming crape myrtle. The motorist sees them in greatest numbers along East Texas roadways, and they are found in abundance along U. S. Highways 69 and 79 near Jacksonville.

Along the East Texas highways in the early spring, the motorist finds wisteria in bloom, particularly on U. S. Highway 80 east of Marshall. Flowering dogwood abounds on the right of ways around Palestine, Nacogdoches, Lufkin, Livingston, and Woodville. Tall green pines provide pleasant scenery along the highways of this area the year round, aided by summer flowers and autumn's brilliant yellows, reds, and browns.

In the picture on the opposite page, Johnson adroitly sketches with his pencil a scene you may recognize along State Highway 43 just northeast of Henderson.

The East Texas oil field intrigued the artist. To overcome its bigness, he selected and painted this simple and colorful segment, below, as seen from the highway just south of Kilgore.

Roadside parks along the highways also attracted Johnson, as they attract thousands of tourists. The picnickers enjoying an outing (next page) in the roadside park by the junction of State Highways 149 and 43 south of Marshall were some of several such groups he stopped to paint in his tour of the state.

East Texas Tanks and Derricks — *Avery Johnson*

Summer Afternoon

Avery Johnson

Excelsior Hotel at the corner of Austin and Vale Streets, Jefferson. Marion County courthouse in the background.

The Blount House at the corner of Ayish and Columbia Streets, San Augustine.

EARLY EAST TEXAS

Much of the romance and adventure of the earliest white settlements in East Texas revolve around some of the old buildings still standing in the area. In this series of pencil sketches, artist E. M. Schwetz revives the flavor of the times and the ageless beauty of those landmarks.

The Excelsior Hotel, in Jefferson, recalls early days in East Texas. Its heavy furniture of mahogany, golden oak, maple, and cherry, and its general architecture hold memories of an age that is graceful and gone.

In its heyday, the Excelsior was host to generals, statesmen, and financiers whose names fill the pages of history. Its register, said to be the oldest in Texas, was signed in 1878 by John Jacob Astor and in 1881 by General Grant.

Over Trammel's Trace, the land on which Jefferson was established, Sam Houston and David Crockett came to Texas. The town grew as water connection was made through Caddo Lake and the Red River to the Mississippi. Sternwheelers brought cargo from St. Louis and New Orleans; oxcarts and wagons delivered Texas goods to Jefferson's wharves. With a population that at one time reached 30,000, Jefferson was the principal river port in the State. It is currently a lumber and cottonseed oil center, with a furniture factory, an iron foundry, machine shops, and canning plants.

The Blount House, in San Augustine, is an architectural gem dating back to the Texas Republic. Colonel S. W. Blount, who built the house in 1839, was a signer of the Texas Declaration of Independence. His home today is sturdy and mellow with age; its tasteful design has met the test of time.

A number of other San Augustine homes bear the Blount House distinguished company. There is the residence of J. Pinckney Henderson, first Governor of Texas after it joined the Union. Among others are the Sharp House, the Cartwright House, built in 1839, and the century-old Cullen and Crockett houses. The Cartwright House was built across the street from the University of San Augustine, which was open until the outbreak of the War Between the States.

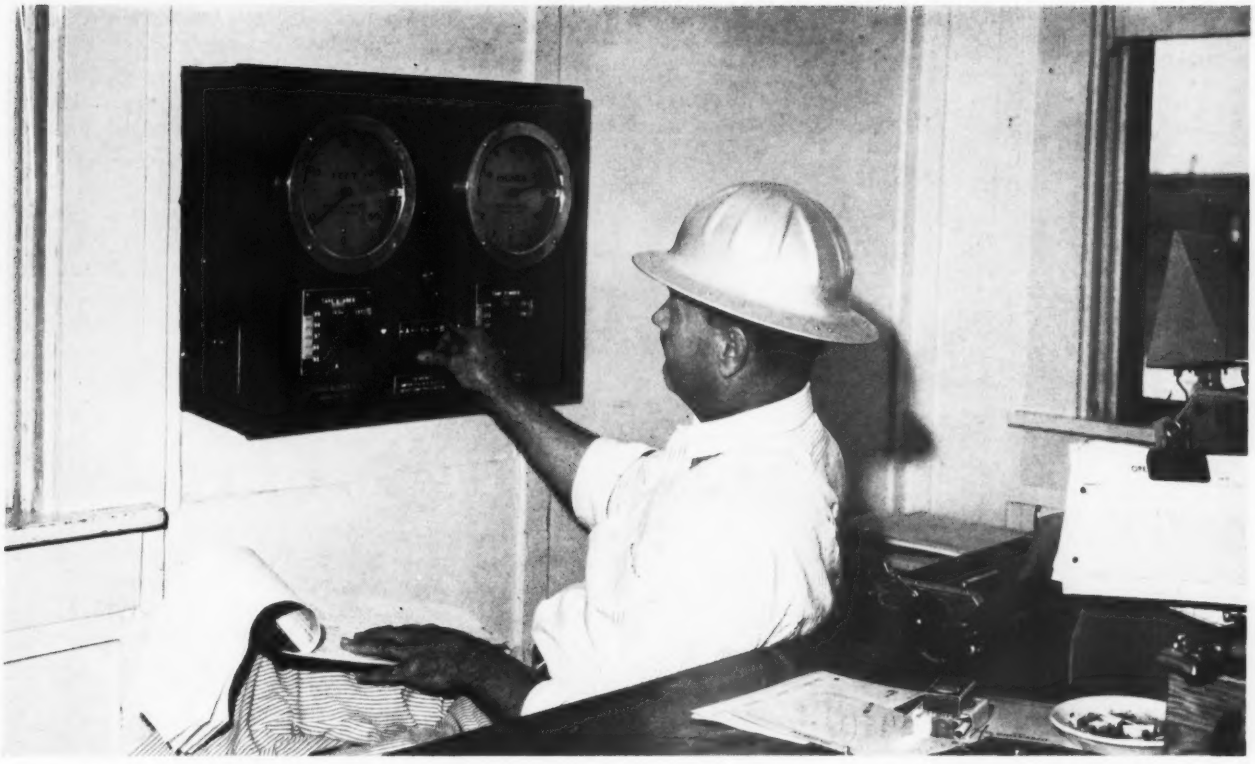
San Augustine itself is one of the oldest towns in Texas. It developed from a settlement that sprang up around Mission Nuestra Senora de los Dolores de los Ais, a Spanish mission re-established on Ayish Bayou in 1721.

The Old Stone Fort, which houses a historical museum at Nacogdoches, stands on the campus of the Stephen F. Austin State Teachers College. The present building is a reconstruction, erected as part of the Texas Centennial program, using stones that were in the original fort. Though not precisely documented, it is generally believed that the fort was built around 1779 or 1780. It has been held and garrisoned at various times by Spain, Mexico, The Republic of Texas, the Confederacy, and the United States.

The town itself, one of the four oldest civilized settlements in Texas, was named for the Nacogdoches Indians. Here in 1716 the Spaniards established Mission Nuestra Senora de Guadalupe, around whose deserted buildings Nacogdoches was permanently established by Antonio Gil Ybarbo in 1779. Some of the early missions established in the Nacogdoches area were abandoned in the late 1700's and removed to San Antonio.

Midway Inn, at Chireno, between Nacogdoches and San Augustine, was known as Half Way Tavern when it was built in the early 1840's. It was one of the better class taverns of its time, built to serve an increasing stream of travelers and homemakers pouring into Texas from the East. Located on *El Camino Real* (The King's Highway), extending from Spanish possessions in Florida to New Mexico, Midway Inn was the first stopping place between the Sabine River and Nacogdoches. Many immigrants spent their first night in Texas at the Inn.

In 1858, Nacogdoches was the center of two stagecoach lines, one a general route to San Antonio and Houston, the other extending eastward into Louisiana. Midway Inn was a stopping place and Chireno was a postoffice on the latter route.



Gauger selects a tank and presses a button on panel in office to get exact measurement of oil level in large storage tanks at pipe line station. Dials indicate electrically feet and inches depth of oil to within one-sixteenth of an inch.

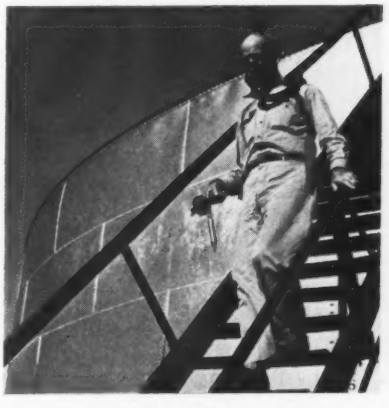
Finger-tip Tank Gauging

Cold, wet nights and sweltering summer afternoons no longer worry many of Humble Pipe Line Company gaugers as much as in the past. Instead of having to walk to each big oil storage tank on a large pump station tank farm to learn the volume of oil from gauges at eye level, gaugers can now sit in their office and press a button to get the same information.

The electric remote tank reading system has made all this possible. Each tank in a large tank farm is connected to the central board in the office. The gauger simply turns a dial to the number of the tank he wishes to gauge and presses a button. On the panel before him the hands on two dials begin to move. In a matter of seconds they tell him in feet and inches, accurate to within one-sixteenth of an inch, how much oil is in the tank. By using a simple table he can interpret this in terms of barrels.

Electric remote reading systems were first tried experimentally at Stations A & B in central West Texas about three years ago. Because the units have proven successful they have been installed at 25 pump stations. Some stations in each of the Pipe Line Company's five divisions are already equipped, and continuous studies are being made of other stations where it may prove practical to install the systems.

Eye-level indicator at side of tank permits gauging without climbing to top of tank; remote transmitter is above.



Trips to top of tanks, gas masks, are gone and time is saved with new electric remote reading systems now being used.

Vicious little sand grains attack producing well from slotted screen at bottom to top choke (magnified section) which regulates flow. Sand in separators, storage tanks also causes lots of trouble.

HARDER THAN STEEL

Tiny grains of sand—nearly as hard as diamonds—complicate drilling and producing operations

IN JUNIOR'S sandpile or at the beach, sand seems pretty harmless when you pick up a handful and let it slide easily through your fingers. But when a few grains are squeezed tightly and rubbed vigorously, their personality changes. They become tough little characters—harder than steel, and almost as hard as diamonds. Their sharp, jagged edges help them wear away many of the most durable metals.

Drillers and production men, particularly in the Gulf Coast region from Brownsville to Mobile, know this only too well. Because sand is so hard and abrasive, it challenges them in every phase of operations from the time a well is drilled until it stops flowing.

Sand attacks in two ways and, by damaging equipment, adds to the cost of producing oil. When held stationary, it gnaws like sandpaper on objects which come in contact with it. In motion with a fluid traveling at high speed, its grinding action amounts to that of sand blasting. As a result of attacks in a well, sand strangles the flow of oil and leads to expensive workover jobs to restore production.

For these reasons drilling and producing men learned long ago that just finding oil is not enough; that getting it out of the ground often is the hardest part of all. They combined efforts with engineers and research men against this enemy that threatened to skyrocket the cost of producing oil. For years their efforts weren't too successful, but slowly the tide has turned until today's outlook is brighter than ever before.

Drillers problem

New techniques have made possible faster drilling rates, but this speeding up has also aggravated the problem of sand abrasion. More weight is placed on bits as they bore into the earth and their blades wear much quicker than before when they pass through hard-crusted sand formations. Drilling mud squirts through the nozzles in bits considerably faster, too. As the mud pulverizes cutttings from the well bottom and carries

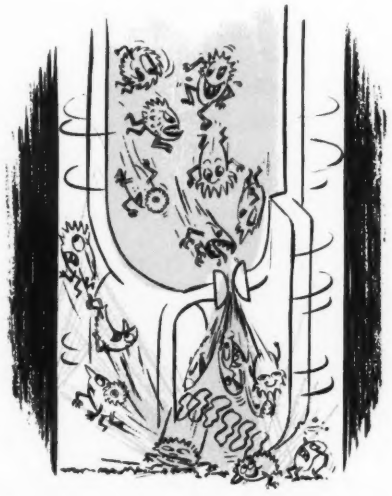
them to the surface, sand from the formation is picked up. When the sand-laden mud is recirculated into the well the nozzles are subjected to extreme wear by sand at high velocity.

Previously, nozzles of hardest steel would last perhaps a day, but with the tripling of mud velocities to about 375 miles per hour, it isn't hard to understand the beating that nozzles began to take. Their life was shortened to about half an hour. Bit makers came to the rescue with tungsten-carbide nozzles that today hold up for more than 24 hours at high mud velocities. Even so, the rate of wear in bits is extremely high.

The entire mud system—including big pumps, pipes, and hose—is chewed on by sand. Since sand under high velocity will eat through an inch of steel in a very short time under some conditions, the principal defense is to use larger, thicker lines with fewer bends. Vital parts of the mud pumps, such as pistons and valves, are made of rubber for longer life. Rubber is used wherever possible, for it withstands the most vicious sand attacks by bouncing the grains off.

Defense at source

But sand destruction during drilling operations is only the beginning, for sand may cause trouble throughout a well's entire life. Sand in a well means plenty of grief, and is the cause for an expensive workover job.

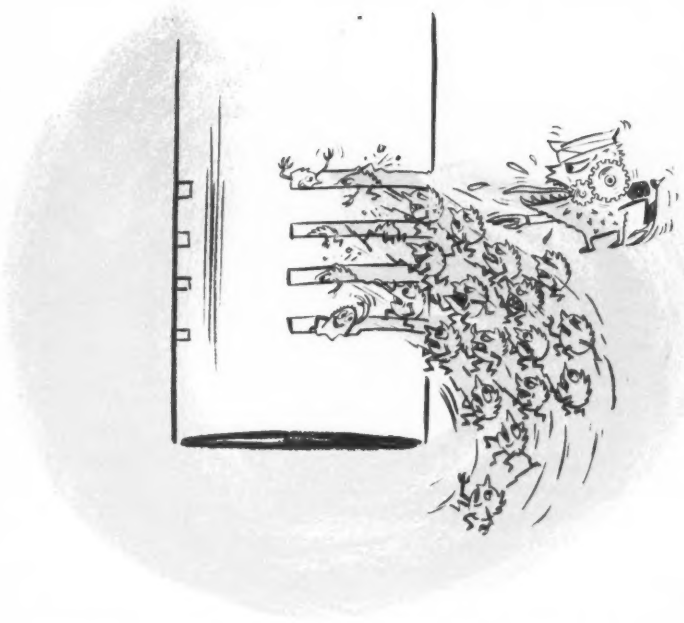


Devilish sand grains in drilling mud grind mud nozzle of drilling bit at high velocity; sand grains from formations wear off cutting edge of bit quickly.

But if sand can be kept out of a well, no damage will result. So production men have worked hard for years to try to control sand at its source—the well bottom.

Their need for a fool-proof screening device that will let oil come into a well and keep sand out has resulted in considerable experimentation. At first, ordinary screen wire was tried, and in some cases this method is still used. During a period of screen development, many other types were tried. The most common today are made of slotted sections of pipe in which the screening slots are thinner than the paper on which this story is printed.

Generally, however, where sand is a serious problem, screens have not stood up very long, for sand grains are stubborn—particularly the tiny ones. They keep gnawing away at the screening slots until a few of them get through. Larger and tougher grains then gouge their way through behind the leaders and enlarge the gap. Millions of charging grains soon hurtle through the broken defense to shoot upward with oil to the surface. On their way they beat a two-fisted attack against the tubing and well head. Later attacks are made against surface equipment through which the sand-laden oil passes.

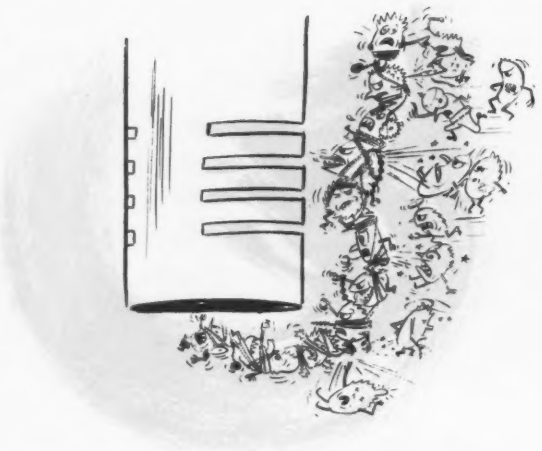


Army of sand grains—carried by oil—attack slotted screen at bottom of well; smaller grains work in first, others enlarge hole.

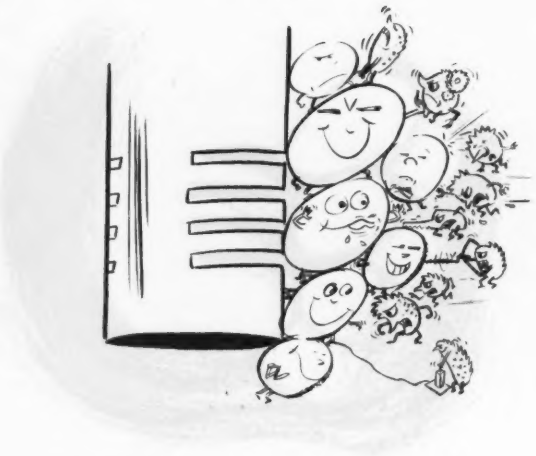
But all of the sand is not carried out of the well by the oil. That which remains begins to strangle the flow of oil, and eventually the well will stop producing. An expensive workover job is then needed to bring the well back to life.

Success with plastic

Undaunted by the shortcomings of mechanical screens, engineers and research men kept right on working. They moved one step closer to controlling sand when consolidating plastic was developed. Consolidating plastic, a chemical mixture, is pumped into a well through the tubing and then is squeezed into the producing sand. There it hardens and cements loose sand grains together around the well bottom. This bond acts as a por-



Plastic bond binds grains of sand nearest well screen together, allows oil through but holds back sand of many producing formations.



Gravel tightly packed around screen—so far 100% effective—"fights sand with sand," holds sand grains back despite all attacks.

ous barrier between the sand formation and the well bottom. Oil will penetrate it, but sand will not.

Here at last was an effective defense against sand—for about three-fourths of the wells that were treated with consolidating plastic began to produce sand-free oil. But the process, encouraging as it was, had its limitations. The plastic would not work properly in every case. Bottom-hole temperatures which climb as high as 200 degrees in deep wells frequently made the plastic harden too quickly. In shallow wells the temperature sometimes was too low to permit proper hardening. The size of sand grains themselves played a big part in determining whether or not a good bond would be made. Chemical reactions in the oil and gas sometimes prevented consolidation. In spite of all these variables, however, consolidating plastic began to prove itself an important weapon against sand.

But 25 per cent of sand-plagued wells were still vulnerable to attack.

"Fight sand with sand"

Then came another break. Humble engineers tried something new about a year ago—gravel packing. On the assumption that gravel previously used had been too coarse to pack properly, they asked themselves: "Why not fight sand with sand?" So, fine gravel, hardly bigger than coarse sand grains themselves and sieved to uniform size, was packed in the bottom of a number of troublesome wells in the Gulf Coast area. Actually, gravel packing is not a new process, for it has been used in oil and water wells for years, but Humble engineers developed a new way for applying it.

More tests to follow

The usual pattern followed was this: First, the screen was pulled. Then placement of the gravel was accomplished by washing it down into the well with salt water. As the washing action was continued, a new screen was lowered into place to keep gravel, not sand, out of the well, for sand will not penetrate very fine gravel.

In the days which followed, these gravel packed wells were watched closely. Normal production was regained, but the engineers didn't let their enthusiasm get the best of them. "How long would the oil continue to be produced without sand in it?" they wondered. So they waited some more and made repeated examinations of the oil for sand content. Each test made their smiles broader, for even today those wells are still producing sand-free oil. Many more wells must be gravel packed, of course, to be sure that this success is no happenstance, but the results already gained are most encouraging. Some of the wells that were gravel packed had previously been treated unsuccessfully with consolidating plastic.

Both consolidating plastic and gravel packing have made it possible to bring wells back into production that once were abandoned because sand troubles had made them too costly to operate. This is especially true of stripper wells that produced only a few barrels of oil a day. The result is more oil to meet the nation's needs.

Perhaps neither gravel packing nor consolidating plastic will prove in the long run to be all that is needed to control sand completely, but preliminary results have certainly shown them to be effective defenses in the areas where tests have been made. At the very least, sand has been forced to fight on more equal terms where once it pretty well had its own way.

For Geophysics Research

NOT one particle of dust can be tolerated in the "clean room" of Humble's new field geophysics laboratory at Friendswood, 18 miles southeast of Houston. Microscopic particles of dust which might affect precision measurements are electronically removed from the air in the windowless "clean room" in the new building where field research is conducted to discover new ways of finding oil.

Amazingly tiny indications give geophysicists clues to where oil might be found. These scientists use gravity meters which measure the pull of gravity — tested to within one ten-millionth of an inch in accuracy! Obviously such infinitely fine work requires special facilities, such as those built into this complete new field laboratory. Accuracy requirements are just as exacting as they are in the Company's main geophysics laboratory in the home office building.

At the new center, laboratory and field research are combined. Three hundred acres of land surround the building where engineers can simulate field operations, and then test their results directly in the laboratory.

A radar antenna mounted on the second-floor "observation tower" is used for testing radar techniques in surveying. Radar is being used more and more extensively by geophysics crews for surveying in marine and rugged land areas.

Some instruments and meters used for research must be kept at specified temperatures for accuracy, so a "hot room" was built to regulate the right temperature to within one one-hundredth of a degree. Temperatures for this specially cork-insulated room can be varied from the cool air-conditioning temperature to that found in the field under a blazing sun.

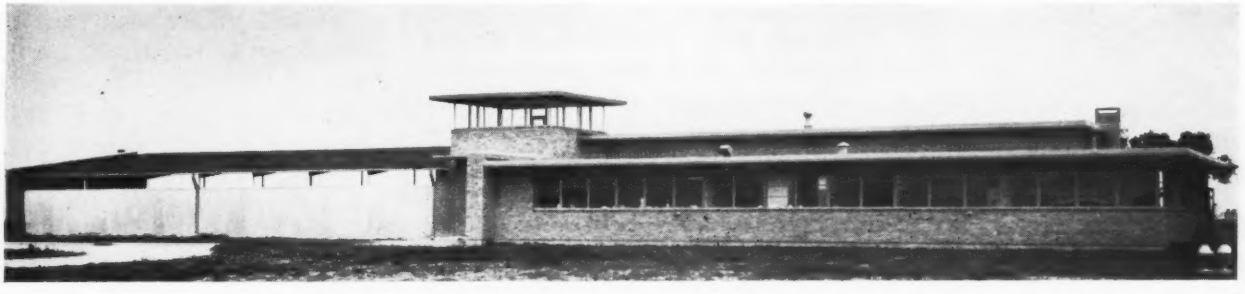
From the seismic room, technicians have a clear view of operations in the field while their instruments record the proceedings. Here, as in the other laboratory rooms, wall "portholes" admit large cables from the field to the instruments. Two separate darkrooms are available for developing seismographic film. The sensitivity of seismograph pick-ups is tested on a "shaking table" which simulates the shaking of the ground when a charge is exploded.

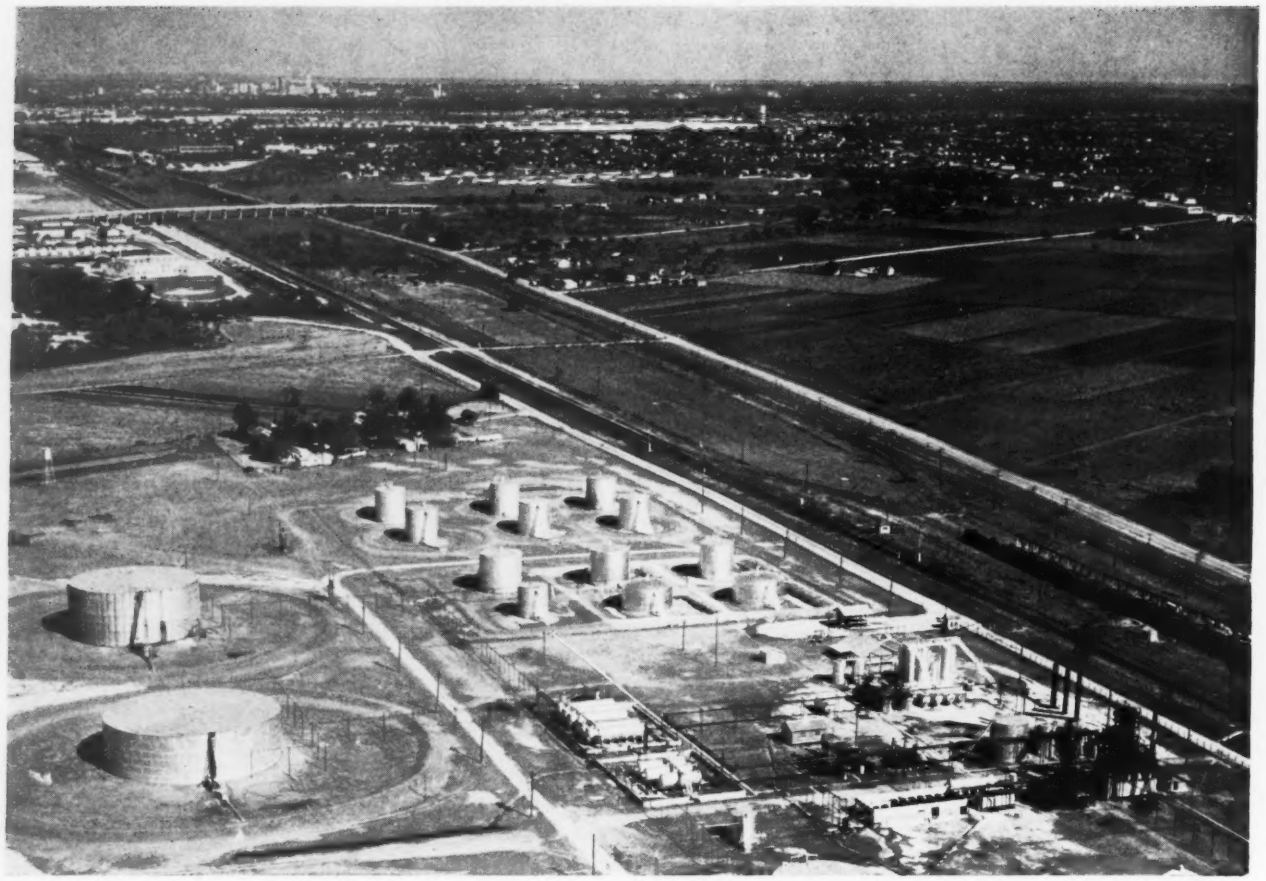
In the back part of the building are two garage laboratories into which instrument trucks may be driven. Workbenches outline each room and ample space is available to carry on experimental work or to make repairs on the truck instruments. Each room is equipped with an overhead crane capable of lifting equipment weighing as much as two tons.

The entire building is air-conditioned and the designers have taken unusual steps to maintain a uniform temperature. When the garage laboratory entrances open for trucks to drive in, air-conditioning vents close; and if inside entrances to the garage laboratories are opened when the truck entrance is open, a warning bell rings. In addition, a lock system prevents garage doors being opened if any of the small doors are open.

These devices and facilities add up primarily to the further perfection of oil finding methods and equipment. And, if Humble geophysicists are called on again to do war research as during World War II, they have an ideal location and the right facilities in this ultra-modern laboratory.

Experimental field station at Friendswood replaces old facilities at Pierce-Junction and supplements research done at Houston office laboratories. Geophysicists conduct precision work with the special facilities at this laboratory.





San Antonio Refinery Closes

In 22 years plant processed 32 million barrels of crude oil and other materials

HUMBLE'S San Antonio Refinery was closed down permanently on August 16. The plant was the last of ten small refineries which the Company has operated during the past thirty years, but has shut down as they became uneconomical. All Company refining operations are now conducted at Baytown.

Operations at the San Antonio crude still were discontinued on August 16, and approximately 10 days later all unfinished stocks had been processed and shipment of products had been completed.

The present refinery started operations in January, 1928, and since that time has processed 31,716,000 barrels of crude and 426,000 barrels of other raw materials. Approximately 1,969,000 barrels of aviation gasoline and 8,548,000 barrels of motor gasoline have been produced and blended during this period. Future motor gasoline requirements for the San Antonio area will be supplied from Baytown by pipe line to the newly built San Antonio terminal.

Employees at San Antonio were given options of being transferred to similar jobs at other locations in the Company, taking termination allowances, or retiring where eligible. Of the 33 people employed at the refinery, 13 were transferred to Baytown refinery, two to the Houston office, and one to San Antonio bulk terminal. Two have retired and 15 have chosen liberal termination allowance.

This was the second refinery Humble had operated in San Antonio. The old Dixie Refinery, at a different location in this area, was operated from September 15, 1917 to January 31, 1922.

THEY HAVE RETIRED

Forty-two long time employees of the Humble Companies have retired since the last issue of THE HUMBLE WAY. All have been with Humble for more than 20 years.

Pipe Line Company: REAGAN G. GRIFFIN, engineer at Pendell, on July 1 after more than 30 years' service . . . HAROLD HILL, engineer at Pendell, on July 1 after more than 30 years' service . . . LEA HOLLINGSHEAD, engineer at Dollarhide, on August 16 after more than 24 years' service . . . JOHN W. MCCULLOUGH, engineer at Harbor Island, on August 18 after almost 23 years' service . . . WILLIAM L. MUELLER, pipe liner at Webster, on July 3 after more than 24 years' service . . . WILLIAM C. PRINCE, district gauger at London, on June 29 after more than 30 years' service . . . GROVER C. SCOTT, engineer at Navasota, on August 1 after almost 30 years' service . . . and HENRY M. WEBB, telegraph operator at Groesbeck, on July 1 after more than 25 years' service.

Production Department: JOHN B. BAGBY, pumper and gauger at Conroe, retired on June 25 after almost 23 years' service . . . JAMES Y. FOSTER, watchman at Talco, on July 10 after more than 21 years' service . . . JOHN F. WALKER, district gauger at Cisco, on August 1 after more than 35 years' service . . . and WILLIAM L. WHITE, pumper and gauger at Hardin, on July 10 after more than 26 years' service.

Baytown Refinery: THOMAS C. BUTLER, guard, on August 1 after more than 24 years' service . . . JAMES B. COLLINS, water pumper, on August 31 after almost 30 years' service . . . GEORGE DANIELS, laborer, on August 1 after more than 28 years' service . . . DAVID C. HICKS, water pumper, on August 27 after more than 29 years' service . . . WILLIAM R. DAVIS, helper second class, on August 19 after almost 24 years' service . . . JEWEL D. ESTETTER, brickmason first class, on August 28 after 30 years' service . . . GROVER C. HAMRICK, toolroom man, on August 1 after almost 24 years' service . . . OSCAR W. HILLARD, separator pumper, on July 21 after more than 27 years' service . . . JESS T. HINTON, pipe fitter first class, on July 18 after almost 29 years' service . . . LABRON L. HINTON, guard, on July 28 after more than 24 years' service . . . SAMUEL LEIDMYR, helper third class, on July 18 after almost 27 years' service . . . BOAD H. MCHUGH, foreman, on July 7 after almost 31 years' service . . . CHARLEY M. HARPER, field supervisor, on August 21 after almost 30 years' service . . . JAMES HODGES, laborer, on August 31 after almost 26 years' service . . . HORACE G. JENKINS, rigger first class, on August 8 after 30 years' service . . . ALBERT KIZLER, assistant general foreman, on June 21 after more than 24 years' service . . . CHARLES M. KNIGHT, machinist first class, on June 25 after almost 30 years' service . . . KARL E. MARTIN, stillman first class, on June 16 after almost 30 years' service . . . ROMAN MARTINEZ, laborer, on August 9 after almost 30 years' service . . . FARLISS W. POPE, separator pumper, on July 18 after more than 25 years' service . . . PABLO REYNA, special laborer, on July 15 after 23 years' service . . . JAMES O. ROBERTSON, machinist second class, on August 14 after 22 years' service . . . NOAH W. SAXTON, boilermaker first class, on August 1 after more than 30 years' service . . . JAMES R. SHEPPARD, helper, on August 1 after almost 22 years' service . . . GEORGE W. STEMM, shift supervisor, on August 1 after more than 23 years' service . . . and JAMES E. STRICKLIN, boat operator, on August 1 after more than 21 years' service.

Sales Department: EBEN W. BERRY, division manager of the West Texas Division Office, retired on August 24 after more than 29 years' service . . . and HERBERT C. DENNETT, district manager of the Southwest Texas Division Office, on July 17 after more than 29 years' service.

Houston Office: FRANK D. HELTON, senior supervisory accountant in Production Accounting, on August 14 after more than 30 years' service . . . and FINLEY M. SCRUGGS, division land man in the Exploration Department, on August 1 after more than 25 years' service.

Rig 29 Captures Drilling Record

On July 30, the day tour crew of Rig 29 drilled 2,570 feet in their regular eight-hour tour, besting the record 2,448 feet set by Rig 28 on May 10. (See "They Drill Faster," THE HUMBLE WAY, May-June, 1950.)

Using a regular jet-type drag bit of the type developed by Humble drilling research, the Rig 29 crew averaged 322 feet per hour in drilling 9⅝-inch hole from 1,910 to 4,485 feet in the Lake Sand field in Southern Louisiana. The evening tour crew which then took over drilled an additional 1,460 feet with the same bit before changing it. The one bit drilled 3,835 feet in 13½ hours.

Humble rigs in areas where harder formations are found have also cut drilling time—some as much as 25 percent.

By the way . . .

Two New Features in Military Service Policy

Humble's new military service policy announced in August is basically the same as that which was in effect during World War II. For those entering the Armed Services there are two new features: Group Life Insurance may be continued; and hospital insurance coverage for dependents may be kept in force.

Other benefits the policy guarantees to Humble employees with more than one year's continuous active service, include: military leave of absence with restoration to their old jobs or relatively similar jobs upon return; a lump sum payment equal to two month's pay upon entry into military service; Survivor Benefits for qualified beneficiaries of an employee; monthly payments equal to the difference between Company pay and military pay not to exceed 50 per cent of his Company pay to eligible dependents; and upon return from military leave, Company service credits will be allowed for prior Company service and military service.

Although employees in the Armed Services will not be covered under the Company's Hospitalization and Surgical Benefits Insurance Plan (since the Government will provide hospital and medical care for them), coverage for qualified dependents may be retained.

Employees with less than a year of service will not be given leaves of absence for military service; however, those on other than strictly temporary assignments who apply for reemployment within ninety days after release from active duty will be restored to their old jobs or similar jobs if still qualified to perform such duties. They will receive Company service credit for their prior Company service and their military service.

Deaths

Since the last issue of THE HUMBLE WAY, ten active employees and seven annuitants have died.

Active employees who have died are ORVEL R. CRUMRINE, 38, pipe liner at Tomball, on July 20; EDWARD L. DAVIS, 37, helper second class at Baytown Refinery, on July 21; WILLIAM R. DURBIN, 45, roustabout and gang pusher at Katy Gas Cycling Plant No. 1, on July 30; MARION J. HAYES, 59, assistant district gauger at Foster, on August 8; WALTER J. KILGORE, 49, shop foreman at Baytown Refinery, on July 27; JOHN J. LARKIN, 55, pipefitter first class at Baytown Refinery, on August 9; JAMES M. NESMITH, 48, farm boss at Mallalieu, on July 12; FORREST C. PARKER, 55, assistant district chief clerk at Pierce Junction, on June 15; BEALER J. PRUETT, 33, helper at Baytown Refinery, on August 1; and WYLIE B. WYATT, 57, gas plant operator first class at American Gas Plant, on July 12.

Annuitants: ANGIE BASHFUL, 66, janitor at Baytown Refinery before his retirement, died on June 7; CRIS S. KISLING, 70, pumper and gauger at London before his retirement, died on July 3; JOHN R. MERCER, 63, water tender at Baytown Refinery before his retirement, died on July 8; JOHN S. OLIVIER, 60, telephone and telegraph equipment foreman before his retirement, died on June 20; CHARLES G. PRIDGEN, 60, roustabout and gang pusher at Goose Creek before his retirement, died on May 27; JOHN C. ROTHMAN, 78, truck salesman at San Antonio before his retirement, died on May 19; and FRANK SMITH, 63, pipe liner in the West Texas Division before his retirement, died on July 15.

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Published every other month for employees and stockholders

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He believes in thrift

And so do 17,306 of his fellow employees who are participating in the Humble Annuity & Thrift Plan. Under this plan every employee with a year or more of active service may establish a savings account and also begin systematically to build a retirement fund. The Company regularly contributes to both phases of the plan to encourage thrift.

At the beginning of this year the number of employees participating was 17,307, or 98.8 per cent of all those eligible. That's proof that Humble people believe in this typically American way of saving for a rainy day.

HUMBLE OIL & REFINING COMPANY